MACADAMIZED ROADS FOR STREETS OF LARGE TOWNS.*

THERE is a prevalent feeling against the employment of broken stone roads for streets, because, as they are usually managed, they are the cause of great inconvenience to householders and others by the dirt and dust they occasion, and also because their maintenance and repairs are very expensive, while the draught of vehicles upon them is very heavy. The object of this paper is to prove, from long continued experience on a large scale, that these objections do not necessarily accompany the use of such roads. In discussing this question the interests of two parties must be considered: those who principally use the road,—the owners and employers of horses and vehicles,—and those who pay for it,—the rate-payers, who are they who would be injured and annoyed if it were unduly expensive or unnecessarily dirty, dusty, and noisy. It is a common error to consider that road the cheapest which costs the least in direct expenditure. If, however, this so-called cheapest road cause waste of horse-power, undue wear and tear of horses and vehicles, loss of time by being unfit for rapid transit, and occasion loss to the inhabitants by filling their dwellings with dust, and covering their clothes with dirt, it is evident that such a road is really very dear. There is an apparent diversity of interest between those who use and those who pay for our public streets; as the principal loss from bad roads falls directly upon those who keep or employ horses and vehicles, while the expense of road repairs falls upon the inhabitants generally. A little consideration, however, will show that this diversity of interest is more apparent than real. It is the interest of all that there should be easy, safe, and cheap means of transit through the public streets; and any increase in the cost of transit is a source of indirect expense even to those who have no horses of their own, as it must add to the cost of everything carried through the streets, and of all hired vehicles, and of all the numberless conveniences which accompany residence in a large town. It must also be remembered that it is very wasteful to allow a road to go out of repair, since it is less costly to keep a road up than to restore it. That roadway is best for the owner or user of a horse or vehicle which can be travelled over most easily, safely, quickly, and cheaply; and that ease, safety, speed, and economy are to be obtained by having the road firm, even, and smooth, and perfectly free from mud or dust, or any form of unattached materials. It is evident that the same qualities will render the roadway most free from noise, dirt, and dust, the three great causes of annoyance and injury to the inhabitants of all ordinary streets. The question which remains to be considered is, whether the advantages of good roads to the inhabitants generally are worth their cost? If the question had to be decided in accordance with the interest of the users and owners of horses merely, no doubt whatever would be entertained. Of whatever nature the surface of a road is to be, it is essential that its foundation should be of firm material, well consolidated, and perfectly drained; if not, the crust becomes loosened and destroyed, the road is rough and uneven, and wears into holes and ruts. Having obtained a good foundation, the next point is to cover it with a hard, compact crust, impervious to water, and laid to a proper cross section. The stones must be broken to one regular size, well raked in, and fixed there by a binding composed of the grit collected in wet weather by the sweeping machines, and preserved for this purpose. This binding must be laid on regularly, and watered until the new material be firmly set, which it will do very quickly and with the regularity of a well-laid pavement. The sharp angles of the stones are preserved, and there is both great saving of material and a firmer crust formed than by the common method of leaving the material to work into its place without the use of binding,—in which case the angles of the stones are worn off and reduced to powder, and at least one-third of the material is wasted in forming a binding in which the stones may set. By the improved method the binding is formed of material that would otherwise be useless. Many road-makers object to the use of binding, on the ground that the road is rendered rotten by it, and that when the road is set it has to be carted away again. This is apt to be the case under bad management, and when ordinary soil is used, the fine particles of which work into mud, and keep the road from setting firmly. But the coarse grit obtained by the sweeping machine off the roads is the very same material as is produced by wearing away the angles of the stones, and when judiciously applied to a new coating it will speedily become as well consolidated and firm as an old road. In the common method not only is there great waste of material, but the loose stones occasion delay by their resistance, great fatigue to the horses, and danger to their feet, while the noise produced by their grinding together is annoying to the inhabitants. Upon the improved method the inconveniences of road repair are incomparably less than those of pavement. Both recoating and repairs may be made without stopping the traffic. Under no circumstances must any imperfection of surface be allowed. If a hollow be not immediately stopped it very quickly extends over the surface. All loose stones should be carefully picked, as every loose stone passed over by heavily laden carriages, if not ground to powder, breaks the crust of the road, and if water be permitted to lodge on the surface it will cause great mischief. It is the neglect of these essential precautions that has led many to consider macadamized roads expensive. They *are* expensive if neglected. On a well made road heavy showers do good, by cleansing them:—so, also, does artificial watering if the road be clean or swept quickly after it is watered. A road which is perfectly dry loses its tenacity, and the surface grinds into dust; whence the economy of judicious watering in hot weather, which preserves the road as well as prevents the annoyance of dust. The practice so common in London and elsewhere of heavily watering a dirty road without cleansing it, and thereby converting the dust into mud, is very injurious to the road, and merely changes one nuisance into another—dust into mud. A great source of waste, both to those who use and to those who repair a road, is to allow it to be dirty. The draught on a dirty road is twice as heavy as on a clean one,—that is, a horse must exert double force to draw his load with the same speed. The cost, however, of employing double force is so great, that the expedient of diminishing the speed is generally adopted, as a horse can exert greater pulling force at a slower pace,—less power being required to carry his own body. It often happens that the extra resistance occasioned by dirt diminishes the speed one-fifth or one-fourth. The effect of the dirt, therefore, is to increase the work by 20 or 25 per cent. It will easily be believed that such a waste far exceeds the cost of the most perfect cleansing. This is the case when cleansing is done by scrapers (the greatest enemy a macadamized road has to contend against). By their use the stones are dragged from their places, and the adhesive dirt is not effectually taken away. Sweeping is the only mode of cleansing that should be allowed, either on streets or turnpike roads. Sweeping by the wide brooms of Mr. Whitworth's machine is preferable to all other modes of cleansing yet tried. It must be evident, that the fact of these wide brooms sweeping longitudinally, with a pressure that can be adjusted according to circumstances, tends powerfully to preserve the road and to consolidate its surface. They press most upon the ridges, and least upon the hollows, thus tending to reduce the former, and fill up the latter. When the dirt is stiff, and adheres firmly to the stones, it should first be well watered, when it may be completely removed by the machine, without disturbing the crust, leaving the surface firm and compact. The use of water for this purpose has been objected to by high authorities, on the ground that it *does* remove the useful grit; but the contrary has been proved by ample experience. I have found the use of the sweeping machines, with the proper employment of water, has reduced the amount of material required for the repair of roads in Birmingham one-third,—namely, from about 20,000 to 13,000 cubic yards. The first-named amount is the average for seven years preceding the introduction of machines, —the latter, the three years subsequent.

The great objection urged against macadamized roads for streets is the annoyance by dust and dirt which they occasion, and many persons prefer submitting to the deafening noise of pavement in order to avoid these; but this would not be the case if water and machine cleansing were adopted, the cost of which would be saved in diminished wear and tear. The entire cost of cleansing and watering Birmingham is about 5,000*l.* per annum,—or less than one penny per week for each of its inhabitants.

J. P. SMITH.

* The following is a portion of a paper read before the British Association for the Advancement of Science.

MANAGEMENT OF COMPETITIONS.

START not, nor throw this aside, on seeing the heading again. You closed your leader a few weeks ago with "Fight the good fight, and fear not." I trust you will apply this to architectural competition, and "fight it out." The subject, it is quite cheering to see, is being so well discussed by your correspondents, and *this time* with such a fore-shadowing of a successful, enduring, movement on the part of the profession, that I trust you will not close your columns to *weekly* communications on this topic (such as you have inserted for the last three weeks), till the right management of architectural competitions be, as it very soon must be, decided on by a "monster" meeting, which a *public* meeting of architects, cordially uniting to look after their common rights, will surely be—

"A stranger animal, crits one,
Sure never lived beneath the sun."

"W. W.'s" letter last week is useful, though I like not the scramble for "laurels" he hints at. The words of the institute's report on competitions, are "*to effect this object rests with the profession at large*," and the institute will, doubtless, not be wanting, should the profession, as the sailors have it, "turn out."

A meeting, to be of use, as ably shown by your correspondent "C.G." (page 435), should be put in communication with every known architect practising in Great Britain; and to effect this, would be attended with more expense than any one society might wish to incur; whereas the most trifling, insignificant subscription on the part of the profession as a body, would amply supply the requisite funds. Perhaps some of your correspondents can point out a mode of dealing with this difficulty.

One word more in allusion to your other last week's correspondent, "A Builder." *He* takes a most correct view of this question, and sees, like a clear-sighted "builder" as he is, that builders are vitally concerned in it, for what on earth can more conduce to the propagation of "blind builders" than the present mode of conducting architectural competitions, which sets architects one against another to produce—not the best structure, oh, no! but the most attractive, gaudy designs, which their authors undertake to realize for a mere song, succeed in the struggle thereby, and straightway (such is competition), institute a scramble of very "blind builders," to endorse their own promises? To THE BUILDER again I say, "fight the good fight, and *fight it out*."—Y.

DISTRICT OF CHRIST CHURCH, ST. GEORGE'S-IN-THE-EAST, LONDON.

IN the year 1847 an appeal was made for public support in order to obtain:—1. A parsonage for the minister of the present church, the Rev. W. Quekett. 2. Three new schools for 700 children, with three residences. 3. A new church of stone, plain but substantial, for 1,000 persons. And 4. A parsonage for the minister of the new church.

The minister exerted himself greatly: Government and the London Diocesan Board of Education assisted: and the parsonage, the schools, and the residences (Mr. Geo. Smith, of the Mercers' Company, architect), have been completed, and a church is now being erected at the cost of a munificent nobleman. About 8,000*l.* have been spent, irrespective of the church. The schools and residences cost 3,858*l.*; the site, 700*l.*; the parsonage, 1,048*l.* There is a deficiency of 211*l.*: 1,500*l.* are wanted for a parsonage for the minister of the new church; and a further appeal is being made. The church is geometrical pointed in style, and is to have a tower and spire at the east end of the south aisle of nave.